Generate Collection

L3: Entry 1 of 2 File: JPAB Jan 6, 1999

PUB-NO: JP411001105A
DOCUMENT-IDENTIFIER: JP 11001105 A
TITLE: PNEUMATIC TIRE

PUBN-DATE: January 6, 1999

INVENTOR-INFORMATION:
NAME COUNTRY
FURUYA, SHINICHI

ASSIGNEE-INFORMATION:
NAME COUNTRY
BRIDGESTONE CORP

APPL-NO: JP09156209
APPL-DATE: June 13, 1997

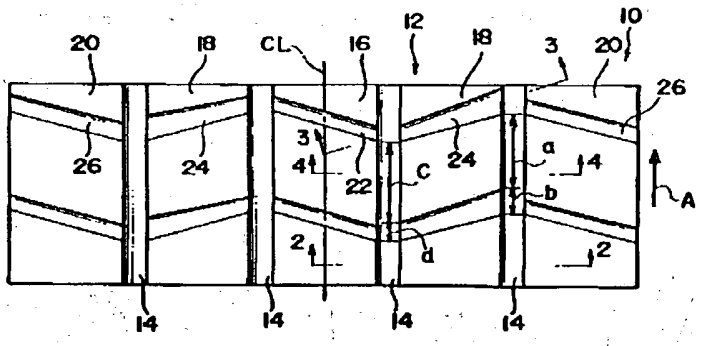
INT-CL (IPC): B60C 11/04; B60C 11/00; B60C 11/13; B60C 11/11

ABSTRACT:

PROBLEM TO BE SOLVED: To minimize right and left wheel difference of lateral fluctuating force so as to improve straight advancing stability.

SOLUTION: In this pneumatic tire, the surface of tread flat parts 18 is separated from a curve enveloping the whole tread surface on tire cross section, inward in the radial direction of the tire toward the shoulder side from the center side, and a bias exponent R=1-1.25α-(1-β)-(1-γ)-0.017.θ of a ground load burden at the tread flat parts 18. Consisting of the separation quantity α, the flat part decrease ratio β of lug grooves 24 to the tread flat parts 18, a lug groove depth change ratio γ (=ri/ro, where ri represents lug groove center end part depth and ro represents shoulder side end depth), and circumferential direction groove inclination θ (deg) is set into a range of 0.3-0.7.

【図1】



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L3: Entry 2 of 2 File: DWPI Jan 6, 1999

DERWENT-ACC-NO: 1999-135677
DERWENT-WEEK: 199915

TITLE: Pneumatic tyre for motor vehicles - has specific portion of tread convex part which is made to curve inwardly

PATENT-ASSIGNEE:

ASSIGNEE	CODE
BRIDGESTONE CORP	BRID

PRIORITY-DATA: 1997JP-0156209 (June 13, 1997)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
JP 11001105 A	January 6, 1999		006	B60C011/04

APPLICATION-DATA:

PUB-NO	APPL-DATE	APPL-NO	DESCRIPTOR
JP11001105A	June 13, 1997	1997JP-0156209	

INT-CL (IPC): B60C 11/00; B60C 11/04; B60C 11/11; B60C 11/13

ABSTRACTED-PUB-NO: JP11001105A
BASIC-ABSTRACT:

NOVELTY - The tyre (10) has a tread convex part (16,18,20) divided by peripheral direction slots (14) which are prolonged along tire peripheral direction. A portion of the tread convex part between tread pin centre and shoulder part is made to curve inwardly.

USE - For motor vehicles.

ADVANTAGE - Stability of the tyre is increased and deflection abrasion of the tyre is prevented. The wheel gap of the horizontal fluctuation power is reduced.

CHOSEN-DRAWING: Dwg.1/10

TITLE-TERMS: PNEUMATIC TYRE MOTOR VEHICLE SPECIFIC PORTION TREAD CONVEX PART MADE CURVE INWARD

DERWENT-CLASS: A95 Q11

CPI-CODES: A12-T01B;

ENHANCED-POLYMER-INDEXING:
Polymer Index [1.1] 018 ; H0124*R Polymer Index [1.2] 018 ; ND01 ; Q9999 Q9234 Q9212 ; Q9999 Q9256*R Q9212 ; K9416 ; B9999 B5287 B5276

SECONDARY-ACC-NO:
CPI Secondary Accession Numbers: C1999-040001
Non-CPI Secondary Accession Numbers: N1999-098996

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特開平11－1105

(43)公開日　平成11年(1999)１月６日

(51)Int.Cl.[6]	識別記号	FI	
Ｂ６０Ｃ　11/04		Ｂ６０Ｃ　11/06	Ｂ
11/00		11/00	Ｆ
11/13		11/11	Ｆ
11/11		11/04	Ｈ
			Ａ

審査請求　未請求　請求項の数５　ＯＬ　（全６頁）

(21)出願番号　特願平9－156209

(22)出願日　平成９年(1997)６月13日

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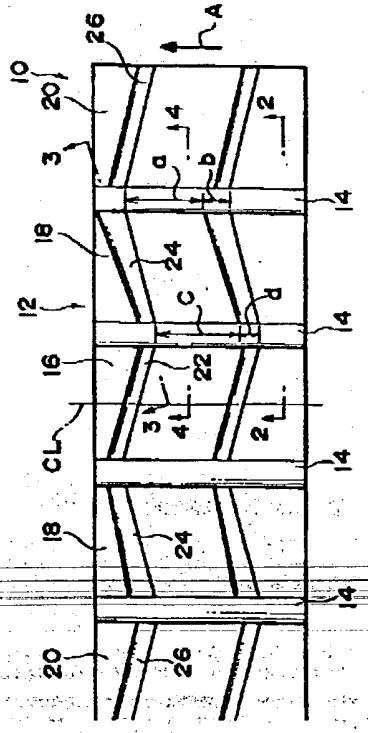
(54)【発明の名称】　空気入りタイヤ

(57)【要約】

【課題】　横変動力の左右輪差を縮小して、直進安定性を向上する。

【解決手段】　空気入りタイヤ１０のトレッド陸部１８の表面が、タイヤ断面上のトレッド表面全体を包絡する曲線に対し、センター側からショルダー側に向かうにつれてタイヤ半径内方向に離隔しておりその離隔量α..と、トレッド陸部１８に対するラグ溝２４の陸部減少比βと、ラグ溝深さ変化比γと、周方向溝傾斜角θ（ｄｅｇ）と、からなる、トレッド陸部１８での接地荷重負担の偏り指数Ｒ＝１－１．２５α－（１－β）－（１－γ）－０．０１７・θが０．３～０．７の範囲に設定されている。



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【特許請求の範囲】

【請求項1】　タイヤトレッド部でタイヤ周方向に延びる周方向溝によって区分されたトレッド陸部のうちトレッドセンターとショルダー部の中間に位置するトレッド陸部表面が、タイヤ断面上のトレッド表面全体を包絡する曲線に対し、センター側からショルダー側に向かうにつれてタイヤ半径内方向に離隔していることを特徴とする空気入りタイヤ。

【請求項2】　タイヤトレッド部でタイヤ周方向に延びる周方向溝によって区分されたトレッド陸部と、該トレッド陸部のうちトレッドセンターとショルダー部の中間に位置するトレッド陸部を周方向に分割して延びるラグ溝を有し、前記トレッド陸部に対する前記ラグ溝の比率が、センター側からショルダー方向に向かうにつれて増加していることを特徴とする空気入りタイヤ。

【請求項3】　タイヤトレッド部でタイヤ周方向に延びる周方向溝によって区分されたトレッド陸部と、該トレッド陸部のうちトレッドセンターとショルダー部の中間に位置するトレッド陸部を周方向に分割して延びるラグ溝を有し、前記ラグ溝の溝深さがセンター側よりショルダー側に向かうにつれて増加していることを特徴とする空気入りタイヤ。

【請求項4】　タイヤトレッド部でタイヤ周方向に延び、トレッド陸部を区画する周方向溝の中心線が、タイヤ半径方向に対してショルダー側に傾いていることを特徴とする空気入りタイヤ。

【請求項5】　タイヤトレッド部でタイヤ周方向に延びる周方向溝によって区分されたトレッド陸部のうち、トレッドセンターとショルダー部の中間に位置する陸部表面の、タイヤ断面上のトレッド表面全体を包絡する曲線に対する、センター側からショルダー側に向かうにつれてタイヤ半径内方向への離隔量αと、

前記トレッド陸部を周方向に分割して延びるラグ溝の、前記トレッド陸部に対するセンター側端での比率をβ_i、ショルダー端での比率をβ_oとした場合の陸部減少比$\beta=(1-\beta_o)/(1-\beta_i)$と、

前記ラグ溝のセンター側端深さをγ_i、ショルダー側端深さをγ_oとしたときのラグ溝深さ変化比$\gamma=\gamma_i/\gamma_o$と、

前記トレッド陸部をはさむ周方向溝の中心線のタイヤ半径方向に対するショルダー側への周方向溝傾斜角θと、に基づく、前記トレッド陸部での接地荷重負担の偏り指数$R=1-1.25\alpha-(1-\beta)-(1-\gamma)-0.017\cdot\theta$が0.3～0.7の範囲にあることを特徴とする空気入りタイヤ。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は空気入りタイヤに係り、特に、高速直進走行時に路面の凹凸による荷重変動

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空気入りタイヤに関する。

【0002】

【従来の技術】通常空気入りタイヤはSA（スリップアングル）＝0で転動しても、プライステアにより進行方向に対し左側に向く横力を発生しており、この状態では車は直進できない。このため、実際の直進状態では車体があるすべり角（B．S．A：ボデースリップアングル）をもち、左右輪の合力がゼロとなる状態を保って運動している。

【0003】この時、このB．S．Aの影響により左輪は車体外側から内側に引っ張られた変形を起こし、これによりタイヤ路面内の圧力分布は、車体外側半部に偏っている。逆に右輪においては、タイヤ路面内の圧力分布は、車体内側半部に偏っている。

【0004】ここで路面凹凸による荷重増加が発生すると、その荷重の増分も左輪は車体外、右輪は車体内側に偏って発生する。ところが路面内で車体外側はワイピングにより車体外側の力を発生している部分であり、逆に路面内で車体内側はワイピングにより車体内側の力を発生している部分である。このため、荷重増加に外、内の偏りがあると横力の増加にも偏りが生じ、左輪は車体外向きの横力変動が大きく、右輪は車体外向きの横力変動が小さい、即ち右輪は車体内向き横力変動が大きいというアンバランスが生じる。

【0005】このアンバランス量となる左右の変動力の合力が車体進行方向を乱す原因となり直進性を悪化させているのであるが、従来は直進性を決定するのが、横変動力の左右輪差であることが判明しておらず、したがってそれを改善する方法も検討できなかったのが実状である。

【0006】

【発明が解決しようとする課題】本発明は上記事実を考慮し、横変動力の左右輪差を縮小し、直進安定性に優れた空気入りタイヤを提供することが目的である。

【0007】

【課題を解決するための手段】請求項1記載の発明の空気入りタイヤは、タイヤトレッド部でタイヤ周方向に延びる周方向溝によって区分されたトレッド陸部のうちトレッドセンターとショルダー部の中間に位置するトレッド陸部表面が、タイヤ断面上のトレッド表面全体を包絡する曲線に対し、センター側からショルダー側に向かうにつれてタイヤ半径内方向に離隔していることを特徴としている。

【0008】従って、請求項1記載の本発明の空気入りタイヤでは、B．S．Aの影響による接地面荷重負担のショルダー側への偏りを減少させることができるために、センターからショルダーの中間にあるトレッド陸部の接地荷重負担をセンター側に偏らせ、左右輪の荷重変動時の横力変動量のアンバランスを減少させることができ

走行性能が向上する。

【0009】請求項2記載の発明の空気入りタイヤは、タイヤトレッド部でタイヤ周方向に延びる周方向溝によって区分されたトレッド陸部と、該トレッド陸部のうちトレッドセンターとショルダー部の中間に位置するトレッド陸部を周方向に分割して延びるラグ溝を有し、前記トレッド陸部に対する前記ラグ溝の比率が、センター側からショルダー方向に向かうにつれて増加していることを特徴としている。

【0010】従って、請求項2記載の本発明の空気入りタイヤでは、B．S．Aの影響による接地面荷重負担のショルダーへの偏りを減少させることができるために、センターからショルダーの中間にあるトレッド陸部の接地荷重負担をセンター側に偏らせ、左右輪の荷重変動時の横力変動量のアンバランスを減少させることができる。この結果、横変動力の左右輪差が縮小し、高速直進走行性能が向上する。

【0011】請求項3記載の発明の空気入りタイヤは、タイヤトレッド部でタイヤ周方向に延びる周方向溝によって区分されたトレッド陸部と、該トレッド陸部のうちトレッドセンターとショルダー部の中間に位置するトレッド陸部を周方向に分割して延びるラグ溝を有し、前記ラグ溝の溝深さがセンター側よりショルダー側に向かうにつれて増加していることを特徴としている。

【0012】従って、請求項3記載の本発明の空気入りタイヤでは、B．S．Aの影響による接地面荷重負担のショルダーへの偏りを減少させることができるために、センターからショルダーの中間にあるトレッド陸部の接地荷重負担をセンター側に偏らせ、左右輪の荷重変動時の横力変動量のアンバランスを減少させることができる。この結果、横変動力の左右輪差が縮小し、高速直進走行性能が向上する。

【0013】請求項4記載の発明の空気入りタイヤは、タイヤトレッド部でタイヤ周方向に延び、トレッド陸部を区画する周方向溝の中心線が、タイヤ半径方向に対してショルダー側に傾いていることを特徴としている。

【0014】従って、請求項4記載の本発明の空気入りタイヤでは、B．S．Aの影響による接地面荷重負担のショルダーへの偏りを減少させることができるために、センターからショルダーの中間にあるトレッド陸部の接地荷重負担をセンター側に偏らせ、左右輪の荷重変動時の横力変動量のアンバランスを減少させることができる。この結果、横変動力の左右輪差が縮小し、高速直進走行性能が向上する。

【0015】請求項5記載の発明の空気入りタイヤは、タイヤトレッド部でタイヤ周方向に延びる周方向溝によって区分されたトレッド陸部のうち、トレッドセンターとショルダー部の中間に位置する陸部表面の、タイヤ断面上のトレッド表面全体を包絡する曲線に対する、センター方向への離隔量αと、前記トレッド陸部を周方向に分割して延びるラグ溝の、前記トレッド陸部に対するセンター側端での比率をβ_i、ショルダー端での比率をβ_oとした場合の陸部減少比$\beta=(1-\beta_o)/(1-\beta_i)$と、前記ラグ溝のセンター側端深さを$\gamma_i$、ショルダー側端深さを$\gamma_o$としたときのラグ溝深さ変化比$\gamma=\gamma_i/\gamma_o$と、前記トレッド陸部をはさむ周方向溝の中心線のタイヤ半径方向に対するショルダー側への周方向溝傾斜角θと、に基づく、前記トレッド陸部での接地荷重負担の偏り指数$R=1-1.25\alpha-(1-\beta)-(1-\gamma)-0.017\cdot\theta$が0．3～0．7の範囲にあることを特徴としている。

【0016】従って、請求項5記載の本発明の空気入りタイヤでは、B．S．Aの影響による接地面荷重負担のショルダーへの偏りを減少させることができるために、センターからショルダーの中間にあるトレッド陸部の接地荷重負担をセンター側に偏らせ、左右輪の荷重変動時の横力変動量のアンバランスを減少させることができる。この結果、横変動力の左右輪差が縮小し、高速直進走行性能が向上する。

【0017】

【発明の実施の形態】以下に本発明の空気入りタイヤの一実施形態を図1～図10にしたがって説明する。

【0018】図1に示すように、本実施形態の空気入りタイヤ10のトレッド12には、タイヤ周方向に沿って延びる周方向溝14が4本形成されており、これらの周方向溝14によって、トレッド陸部16、18、20が、タイヤ幅方向に対してトレッドセンターCLからショルダー部へ向けて順に区分されている。また、トレッドセンターCLからショルダー部へ向かって各トレッド陸部16、18、20を周方向に分割して延びるラグ溝22、24、26が、それぞれタイヤ周方向に沿って複数本形成されている。

【0019】トレッドセンターCLを中心に左右のラグ溝24は、タイヤ幅方向に対してトレッド陸部16の端部側から矢印A方向（タイヤ回転方向）または、その反対方向へ傾斜して延び、左右のラグ溝26は、隣接する左右のラグ溝24の傾斜方向と反対方向へ傾斜している。

【0020】また、本実施形態の空気入りタイヤ10では、図2に示される如く、各トレッド陸部16、18、20のうち、トレッドセンターCLとショルダー部の中間に位置するトレッド陸部18の表面18Aが、タイヤ断面上のトレッド表面全体を包絡する曲線Mに対し、トレッドセンターCL側（図2の左側）からショルダー側（図2の右側）に向かうにつれてタイヤ半径内方向（図2の下方）に離隔しており、その離隔量がα_{max}となっている。

【0021】また、本実施形態の空気入りタイヤ10で

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グ溝２４の比率が、センター側からショルダー方向に向かうにつれて増加している。なお、トレッドセンターＣＬ側端での比率をβ_i＝ｃ／（ｃ＋ｄ）とし、ショルダー端側での比率をβ_o＝ｂ／（ａ＋ｂ）とすると陸部減少比βは、β＝（１－β_o）／（１－β_i）となる。

【００２２】また、本実施形態の空気入りタイヤ１０では、図３に示される如く、ラグ溝２４の溝深さがトレッドセンターＣＬ側２４Ａよりショルダー側２４Ｂに向かうにつれて増加している。なお、ラグ溝２４のセンター側端深さをγ_i、ショルダー側端深さをγ_oとしたときのラグ溝深さ変化比γは$\gamma=\gamma_i/\gamma_o$となる。

【００２３】また、本実施形態の空気入りタイヤ１０のトレッド１２では、図４に示される如く、トレッド陸部１８をはさむ周方向溝１４の中心線Ｓ１、Ｓ２がタイヤ半径方向に対してショルダー側（図４の右側）に周方向溝傾斜角θ（ｄｅｇ）傾いている。

【００２４】さらに、本実施形態の空気入りタイヤ１０では、上記、α、β、γ、θの各値が、これらの各値に基づく、トレッド陸部１８での接地荷重負担の偏り指数Ｒ＝１－１．２５α－（１－β）－（１－γ）－０．０１７・θが０．３～０．７の範囲となるように、それぞれ設定されている。

［試験例］本発明の効果を確かめるために、本発明が適用された実施例タイヤにて、次のデータを測定した。

【００２５】図２に示される如く、トレッド陸部１８での接地圧周方向積分値のショルダ側の値Ｆ０とセンタ側の値Ｆ１との比Ｒ＝Ｆ０／Ｆ１をトレッド陸部での接地荷重負担の偏り指数Ｒとし、図６に示される如く、トレッド陸部での接地荷重負担の偏り指数Ｒと、路面全体の荷重中心位置の移動指数Ｓ、即ち、接地幅に対する接地＊圧中心移動量との関係を測定すると、偏り指数Ｒが１００％に近いほど移動指数Ｓが０％に近く、偏り指数Ｒが７０％を切るあたりから移動指数Ｓが略４％で一定になり効果は飽和する。

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【００２６】また、図５に示される如く、トレッド陸部での接地荷重負担の偏り指数Ｒと、トレッド陸部内に接地圧差があった場合の偏摩耗性の指標としての摩耗エネルギーＥとの関係を測定すると、偏り指数Ｒが１００～７０％では摩耗エネルギーＥが増加し偏摩耗しやすい。さらに偏り指数Ｒが下がると摩耗エネルギーＥは減少し、偏り指数Ｒが５０％程度での摩耗エネルギーＥが偏り指数Ｒが１００％での摩耗エネルギーＥと同等となる。さらに偏り指数Ｒ小さくなると、摩耗エネルギーＥは減少し続け、逆に圧の高い部分での摩耗が速くなるため、やはり偏摩耗しやすくなる。

【００２７】これらから、接地荷重負担の偏り指数Ｒの適正値は理想的には５０％、現実的な範囲として３０％～７０％の範囲とすることが望ましい。

【００２８】なお、離隔量α、陸部減少比β、ラグ溝深さ変化比γ、及び周方向溝傾斜角θの接地荷重負担の偏り指数Ｒへの影響を、それぞれ測定したものが図７～１０であり、これらの測定結果からα、β、γ、θの組み合わせ要因として接地荷重負担の偏り指数Ｒ＝１－１．２５α－（１－β）－（１－γ）－０．０１７・θを０．３～０．７の範囲に設定することで、偏摩耗し難く且つ直進安定性に優れた例えば表１に示される比較例１、２、３のタイヤ（何れもタイヤサイズは２２５／５０Ｒ１６）が得られる。

【００２９】

【表１】

	基準	比較例１	比較例２	比較例３
α	0	0.4	0.2	0
β	1.0	0.9	1.0	0.9
γ	1.0	1.0	0.8	1.0
θ	0°	0°	10°	20°
R	1.0	0.4	0.38	0.56
左右変動力差	6.5 kg	1.7 kg	2.6 kg	4.6 kg
官能評価	―	＋4点	＋3点	＋2点

この表１で、「左右変動力差」とは、左右輪条件に対し、それぞれボディースリップ角、ＣＡ角（キャンバー※停止させ、その状態で荷重を一定値（ここでは５０ｋｇ使用）増加させたときの荷重増加前後のＦ（接地圧周方

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の差分の合力を算出した値である。

【0030】また、「官能評価」は、一定の直線をトレースする様に走行し、その時の車の向きの変動、舵力の変動をドライバーが相対評価し、車の向きの変動、舵力の変動が少ない方が良い、即ち点数を多くした評価である。

【0031】

【発明の効果】以上説明したように、請求項1～5に記載の空気入りタイヤは上記の構成としたので、偏摩耗し難く且つ直進安定性に優れているという優れた効果を有する。

【図面の簡単な説明】

【図1】本発明の第1の実施形態に係る空気入りタイヤのトレッドの一部を示す平面図である。

【図2】図1の2－2線に沿った断面図である。

【図3】図1の3－3線に沿った断面図である。

【図4】図1の4－4線に沿った断面図である。

【図5】接地荷重負担の偏り指数Rと摩耗エネルギーEとの関係を示すグラフである。

【図6】接地荷重負担の偏り指数Rと路面全体の荷重中心位置の移動指数Sとの関係を示すグラフである。

【図7】離隔量αの接地荷重負担の偏り指数Rへの影響を示すグラフである。

【図8】陸部減少比βの接地荷重負担の偏り指数Rへの影響を示すグラフである。

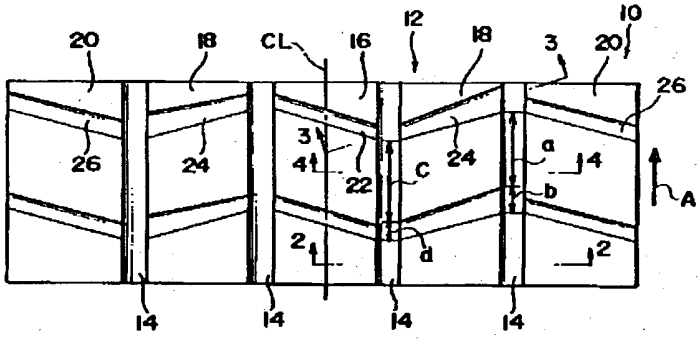
【図9】ラグ溝深さ変化比γの接地荷重負担の偏り指数Rへの影響を示すグラフである。

【図10】周方向溝傾斜角θの接地荷重負担の偏り指数Rへの影響を示すグラフである。

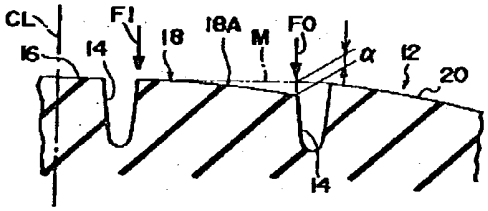
【符号の説明】

10　空気入りタイヤ
12　トレッド
14　周方向溝
16　トレッド陸部
18　トレッド陸部
18A　トレッド陸部の表面
20　トレッド陸部
22　ラグ溝
24　ラグ溝
26　ラグ溝

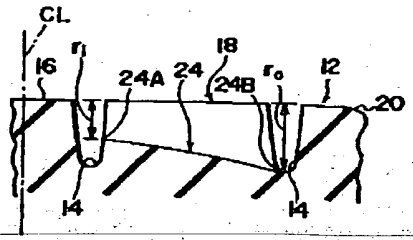
【図1】



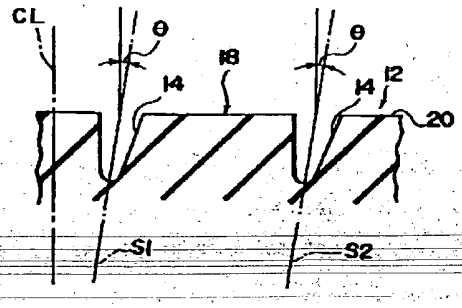
【図2】



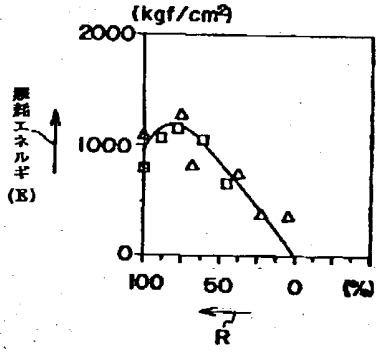
【図3】



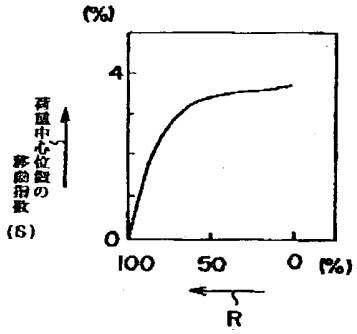
【図4】



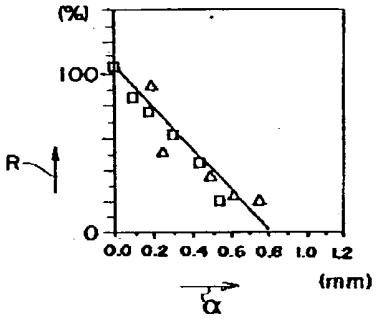
【図5】



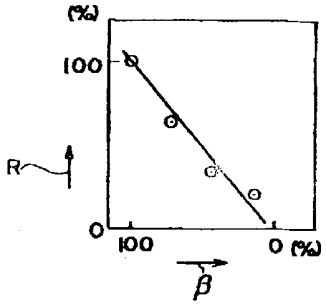
【図6】



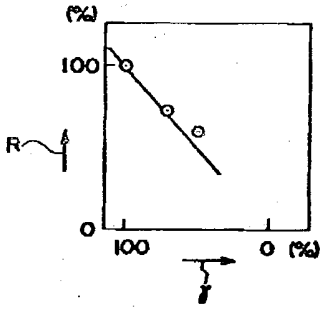
【図7】



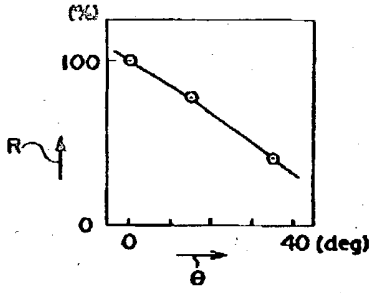
【図8】



【図9】



【図10】



* NOTICES * machine translation for Japan 11-1105

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to a pneumatic tire and relates to the pneumatic tire which reduced the left right wheel difference of the horizontal fluctuation force which the load fluctuation by the irregularity of a road surface becomes a cause, and is especially generated at the time of high-speed rectilinear-propagation transit.
[0002]
[Description of the Prior Art] Usually, even if a pneumatic tire rolls by SA(slip angle) =0, the lateral force which turns to left-hand side to a travelling direction by the ply steer is generated, and a vehicle cannot go straight on in this condition. For this reason, it has the angle of slide (B. S.A:body slip angle) which has a car body in the state of actual rectilinear propagation, and the condition that resultant force of a left right wheel serves as zero is maintained, and it is exercising.
[0003] At this time, under the effect of this B.S.A, a left wheel causes the deformation pulled inside from the car-body outside, and, thereby, the pressure distribution in a tire road surface incline toward the car-body outside half section. Conversely, in the right wheel, the pressure distribution in a tire road surface incline toward the car-body inside half section.
[0004] If the increment in a load by road surface irregularity occurs here, car body outside, the increment of the load will also incline toward the car-body inside, and, as for a left wheel, will generate a right wheel. However, a car-body outside is a part which has generated the force of a car-body outside by wiping within a road surface, and it is the part to which the car-body inside has generated the force of the car-body inside by wiping within a road surface conversely. For this reason, if the bias of outer inside is in the increment in a load, a bias will arise also in the increment in lateral force, the lateral-force fluctuation of car-body outwardness of a left wheel is large, and the imbalance that the sense lateral-force fluctuation in a car body is large produces a right wheel small [lateral-force fluctuation of car-body outwardness / right wheel].
[0005] Although it becomes the cause in which resultant force of the fluctuation force on either side it is weak in this amount of imbalance disturbs a car-body travelling direction and rectilinear-propagation nature is worsened, the actual condition was not able to examine how it not to become clear that the left right wheel difference of the horizontal fluctuation force determines rectilinear-propagation nature conventionally, therefore to improve it.
[0006]
[Problem(s) to be Solved by the Invention] It is the object to offer the pneumatic tire which this invention reduced the left right wheel difference of the horizontal fluctuation force in consideration of the above-mentioned data, and was excellent in rectilinear-propagation stability.
[0007]
[Means for Solving the Problem] The pneumatic tire of invention according to claim 1 is characterized by being isolated to tire radius inboard as the tread land part front face located in the medium of a tread pin center,large and the shoulder section among the tread land parts classified by the hoop direction slot

which extends in a tire hoop direction goes to a shoulder side from a pin center,large side to the curve which envelops the whole tread front face on a tire cross section in the tire-tread section.
[0008] Therefore, in the pneumatic tire of this invention according to claim 1, since the bias to the shoulder of the ground-plane load burden under the effect of B.S.A can be decreased, the touch-down load burden of the tread land part which exists in the medium of a shoulder from a pin center,large can be biased toward a pin center,large side, and the imbalance of the amount of lateral-force fluctuation at the time of load fluctuation of a left right wheel can be decreased. Consequently, the left right wheel difference of the horizontal fluctuation force contracts, and high-speed rectilinear-propagation performance-traverse ability improves.
[0009] The pneumatic tire of invention according to claim 2 has the lug slot which divides into a hoop direction the tread land part classified by the hoop direction slot which extends in a tire hoop direction, and the tread land part located in the medium of a tread pin center,large and the shoulder section among these tread land parts, and extends in the tire-tread section, and is characterized by the ratio of said lug slot to said tread land part increasing as it goes in the direction of a shoulder from a pin center,large side.

[0010] Therefore, in the pneumatic tire of this invention according to claim 2, since the bias to the shoulder of the ground-plane load burden under the effect of B.S.A can be decreased, the touch-down load burden of the tread land part which exists in the medium of a shoulder from a pin center,large can be biased toward a pin center,large side, and the imbalance of the amount of lateral-force fluctuation at the time of load fluctuation of a left right wheel can be decreased. Consequently, the left right wheel difference of the horizontal fluctuation force contracts, and high-speed rectilinear-propagation performance-traverse ability improves.
[0011] The pneumatic tire of invention according to claim 3 is characterized by increasing as it has the lug slot which divides into a hoop direction the tread land part classified by the hoop direction slot which extends in a tire hoop direction, and the tread land part located in the medium of a tread pin center,large and the shoulder section among these tread land parts, and extends in the tire-tread section and the channel depth of said lug slot goes to a shoulder side from a pin center,large side.
[0012] Therefore, in the pneumatic tire of this invention according to claim 3, since the bias to the shoulder of the ground-plane load burden under the effect of B.S.A can be decreased, the touch-down load burden of the tread land part which exists in the medium of a shoulder from a pin center,large can be biased toward a pin center,large side, and the imbalance of the amount of lateral-force fluctuation at the time of load fluctuation of a left right wheel can be decreased. Consequently, the left right wheel difference of the horizontal fluctuation force contracts, and high-speed rectilinear-propagation performance-traverse ability improves.
[0013] The pneumatic tire of invention according to claim 4 is prolonged in a tire hoop direction in the tire-tread section, and is characterized by the center line of the hoop direction slot which divides a tread land part leaning to a shoulder side to the tire radial.
[0014] Therefore, in the pneumatic tire of this invention according to claim 4, since the bias to the shoulder of the ground-plane load burden under the effect of B.S.A can be decreased, the touch-down load burden of the tread land part which exists in the medium of a shoulder from a pin center,large can be biased toward a pin center,large side, and the imbalance of the amount of lateral-force fluctuation at the time of load fluctuation of a left right wheel can be decreased. Consequently, the left right wheel difference of the horizontal fluctuation force contracts, and high-speed rectilinear-propagation performance-traverse ability improves.
[0015] The inside of the tread land part into which the pneumatic tire of invention according to claim 5 was classified by the hoop direction slot which extends in a tire hoop direction in the tire-tread section, As it goes to a shoulder side from the pin center,large side to the curve which envelops the whole tread front face on a tire cross section on the front face of a land part located in the medium of a tread pin center,large and the shoulder section The amount alpha of isolation to tire radius inboard It is betao about the ratio in betai and a shoulder edge in the ratio in the pin center,large side edge to said tread land part of the lug slot which divides said tread land part into a hoop direction, and extends. Land part

reduction ratio beta=(1-betao)/at the time of carrying out (1-betai), the pin center,large side edge depth of said lug slot -- gammai and the shoulder side edge depth -- gammao ** -- lug channel depth change ratio gamma=gamma i/gammao when carrying out The hoop direction slot tilt angle theta by the side of the shoulder to the tire radial of the center line of the hoop direction slot said whose tread land part is pinched It is characterized by being alike and bias characteristic R=1-1.25alpha-(1-beta)-(1-gamma)-0.017 and theta of the touch-down load burden in said based tread land part being in the range of 0.3-0.7.

[0016] Therefore, in the pneumatic tire of this invention according to claim 5, since the bias to the shoulder of the ground-plane load burden under the effect of B.S.A can be decreased, the touch-down load burden of the tread land part which exists in the medium of a shoulder from a pin center,large can be biased toward a pin center,large side, and the imbalance of the amount of lateral-force fluctuation at the time of load fluctuation of a left right wheel can be decreased. Consequently, the left right wheel difference of the horizontal fluctuation force contracts, and high-speed rectilinear-propagation performance-traverse ability improves.

[0017]

[Embodiment of the Invention] One operation gestalt of the pneumatic tire of this invention is explained according to drawing 1 - drawing 10 below.

[0018] As shown in drawing 1 , four hoop direction slots 14 which extend along a tire hoop direction are formed in the tread 12 of the pneumatic tire 10 of this operation gestalt, and the tread land parts 16, 18, and 20 are classified in order by these hoop direction slots 14 from the tread pin center,large CL towards the shoulder section to the tire cross direction. Moreover, two or more lug slots 22, 24, and 26 which divide each tread land parts 16, 18, and 20 into a hoop direction, and extend toward the shoulder section from the tread pin center,large CL are formed along the tire hoop direction, respectively.

[0019] To the tire cross direction, the lug slot 24 of right and left centering on the tread pin center,large CL inclines toward the direction (tire hand of cut) of arrow-head A, or its opposite direction, and extends from the edge side of the tread land part 16, and the lug slot 26 on on either side inclines toward the adjoining dip direction and adjoining opposite direction of the lug slot 24 on either side.

[0020] moreover, in the pneumatic tire 10 of this operation gestalt As shown in drawing 2 , surface 18A of the tread land part 18 located in the medium of the tread pin center,large CL and the shoulder section among each tread land parts 16, 18, and 20 To the curve M which envelops the whole tread front face on a tire cross section, it is isolated to tire radius inboard (lower part of drawing 2) as it goes to a shoulder side (right-hand side of drawing 2) from the tread pin center,large CL side (left-hand side of drawing 2), and the amount of isolation serves as alphamm.

[0021] Moreover, in the pneumatic tire 10 of this operation gestalt, as shown in drawing 1 , the ratio of the lug slot 24 to the tread land part 18 is increasing as it goes in the direction of a shoulder from a pin center,large side. In addition, if the ratio in a tread pin center,large CL side edge is made into betai =c/(c+d) and the ratio in shoulder one end is made into betao =b/(a+b), the land part reduction ratio beta will become beta=(1-betao)/(1-betai).

[0022] Moreover, in the pneumatic tire 10 of this operation gestalt, it is increasing as are shown in drawing 3 and the channel depth of the lug slot 24 goes to shoulder side 24B from tread pin center,large CL side 24A. In addition, it is gammao about gammai and the shoulder side edge depth in the pin center,large side edge depth of the lug slot 24. The lug channel depth change ratio gamma when carrying out is gamma=gamma i/gammao. It becomes.

[0023] hoop-direction slot tilt-angle theta (deg) Moreover, by the tread 12 of the pneumatic tire 10 of this operation gestalt, as shown in drawing 4 , the center lines S1 and S2 of the hoop direction slot 14 whose tread land part 18 is pinched lean to the shoulder side (right-hand side of drawing 4) to the tire radial.

[0024] Furthermore, in the pneumatic tire 10 of this operation gestalt, it is set up, respectively so that bias characteristic R=1-1.25alpha-(1-beta)-(1-gamma)-0.017 and theta of the touch-down load burden in the tread land part 18 based on each of these values in each value of the above, and alpha, beta, gamma and theta may become the range of 0.3-0.7.

In order to confirm the effectiveness of [example of trial] this invention, the following data were measured with the example tire to which this invention was applied.
[0025] R=F0/F1 is made into the bias characteristic R of the touch-down load burden in a tread land part. it is shown in drawing 2 -- as -- the ratio of the value F0 by the side of the shoulder of the ground pressure hoop direction integral value in the tread land part 18, and the value F1 by the side of a center -- As shown in drawing 6 , the bias characteristic R of the touch-down load burden in a tread land part If relation with the ground pressure core movement magnitude to the migration characteristic S, i.e., the touch-down width of face, of a load-center location of the whole road surface is measured, the hit where near and the bias characteristic R are [the migration characteristic S] below 70% to the migration characteristic S will become fixed at 4% of abbreviation at 0%, and effectiveness will be saturated, so that the bias characteristic R is close to 100%.
[0026] Moreover, if relation with the wear energy E as an index of partial wear nature when a ground pressure difference is in the bias characteristic R of the touch-down load burden in a tread land part and a tread land part is measured as shown in drawing 5 , at 100 - 70%, the wear energy E will increase and it will be easy to carry out partial wear of the bias characteristic R. If the bias characteristic R furthermore falls, the wear energy E will decrease and the bias characteristic R will become [the bias characteristic R / the wear energy E in about 50%] equivalent to the wear energy E in 100%. further -- the bias characteristic R -- if it becomes small, since it continues decreasing and wear in the high part of ** becomes quick at reverse, it will become easy to carry out partial wear of the wear energy E too.
[0027] As for the proper value of the bias characteristic R of these to a touch-down load burden, it is ideally desirable to consider as 30% - 70% of range as realistic range 50%.
[0028] In addition, the effect of the bias characteristic R on the touch-down load burden of the amount alpha of isolation, the land part reduction ratio beta, the lug channel depth change ratio gamma, and the hoop direction slot tilt angle theta What was measured, respectively is drawing 7 -10. From these measurement results to alpha Bias characteristic R=1-1.25alpha-(1-beta)-(1-gamma)-0.017 and theta of a touch-down load burden by setting it as the range of 0.3-0.7 as a combination factor of beta, gamma, and theta The tire (for all, tire size is 225 / 50R16) of the examples 1, 2, and 3 of a comparison which were [that it is hard to carry out partial wear] excellent in rectilinear-propagation stability and which are shown, for example in a table 1 is obtained.
[0029]
[A table 1]

	基準	比較例1	比較例2	比較例3
α	0	0.4	0.2	0
β	1.0	0.9	1.0	0.9
γ	1.0	1.0	0.8	1.0
θ	0 °	0 °	10 °	20 °
R	1.0	0.4	0.38	0.56
左右変動力差	6.5 kg	1.7 kg	2.6 kg	4.6 kg
官能評価	——	+ 4点	+ 3点	+ 2点

With this table 1, with a "right-and-left strange power difference", after giving a body slip angle and CA angle (camber angle), respectively and making it roll by the load to left right wheel conditions at the time of a stationary, transit is once stopped and the difference of F (ground pressure hoop direction integral value) before and behind the increment in a load when carrying out the increment of the load in constant value (here, 50kg being used) in that condition is measured. Then, it is the value which computed resultant force of this difference in right-and-left conditions.

[0030] Moreover, "organic-functions assessment" is the assessment ran so that a fixed straight line might be traced, and the driver made relative evaluation on fluctuation of the sense of the vehicle at that time, and fluctuation of ****, and it made [whose direction with little fluctuation of the sense of a vehicle and fluctuation of **** was good, namely, / many] mark.

[0031]

[Effect of the Invention] Since the pneumatic tire according to claim 1 to 5 was considered as the above-mentioned configuration as explained above, it has the outstanding effectiveness of excelling in rectilinear-propagation stability it being hard to carry out partial wear.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] The pneumatic tire characterized by being isolated to tire radius inboard as the tread land part front face located in the medium of a tread pin center,large and the shoulder section among the tread land parts classified by the hoop direction slot which extends in a tire hoop direction goes to a shoulder side from a pin center,large side to the curve which envelops the whole tread front face on a tire cross section in the tire-tread section.
[Claim 2] The pneumatic tire with which it has the lug slot which divides into a hoop direction the tread land part classified by the hoop direction slot which extends in a tire hoop direction, and the tread land part located in the medium of a tread pin center,large and the shoulder section among these tread land parts, and extends in the tire-tread section, and the ratio of said lug slot to said tread land part is characterized by increasing as it goes in the direction of a shoulder from a pin center,large side.
[Claim 3] The pneumatic tire characterized by increasing as it has the lug slot which divides into a hoop direction the tread land part classified by the hoop direction slot which extends in a tire hoop direction, and the tread land part located in the medium of a tread pin center,large and the shoulder section among these tread land parts, and extends in the tire-tread section and the channel depth of said lug slot goes to a shoulder side from a pin center,large side.
[Claim 4] The pneumatic tire characterized by the center line of the hoop direction slot which extends in a tire hoop direction in the tire-tread section, and divides a tread land part leaning to a shoulder side to the tire radial.
[Claim 5] The inside of the tread land part classified by the hoop direction slot which extends in a tire hoop direction in the tire-tread section, As it goes to a shoulder side from the pin center,large side to the curve which envelops the whole tread front face on a tire cross section on the front face of a land part located in the medium of a tread pin center,large and the shoulder section The amount alpha of isolation to tire radius inboard It is betao about the ratio in betai and a shoulder edge in the ratio in the pin center,large side edge to said tread land part of the lug slot which divides said tread land part into a hoop direction, and extends. Land part reduction ratio beta=(1-betao)/at the time of carrying out (1-betai), the pin center,large side edge depth of said lug slot -- gammai and the shoulder side edge depth -- gammao ** -- lug channel depth change ratio gamma=gamma i/gammao when carrying out The hoop direction slot tilt angle theta by the side of the shoulder to the tire radial of the center line of the hoop direction slot said whose tread land part is pinched The pneumatic tire characterized by being alike and bias characteristic R=1-1.25alpha-(1-beta)-(1-gamma)-0.017 and theta of the touch-down load burden in said based tread land part being in the range of 0.3-0.7.

[Translation done.]